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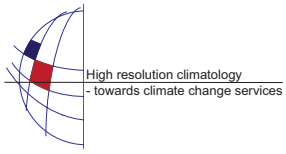

Temporal-spatial characteristics of area-averaged sensible heat flux by Large Aperture Scintillometer over Hai River Basin

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Due to the wide and deep application of Large Aperture Scintillometer (LAS), the scintillation method exhibits as a robust technique in measuring area-averaged sensible heat fluxes. As the path length of LAS is comparable to the pixel size of satellite images and grid scale of hydrological models, the measurements are helpful for validation. Meanwhile LAS has the potential to explore the scale effect, especially to bridge the gap from local to regional flux measurement.

In our analysis, the ground measurements including LAS, Eddy Covariance (EC) system and Automatic Weather System(AWS), as well as TM/MODIS satellite in Miyun, Guantao and Daxing sites over Hai River Basin from 2008-2009 were selected, which can represent three different heterogeneous surfaces in Hai River Basin. After data processing and quality control, continuous sensible heat flux (Hlas) data on Kilometers Scale were obtained over various surfaces.

Based on the footprint model of LAS, the distribution of source area for LAS measurements had been analyzed over Miyun, Guantao and Daxing sites in January, April, July and October, 2008. And then the daily variation of Hlas in January, April, July and October in 2008 over the three sites have been analyzed; the value and tendency of variation in these months are different among these sites, which are in accordance with the local crop phenophases. From the comparison of daily mean net radiation (Rn) and Hlas from 2008-2009 over the three sites, it can be seen the seasonal variation of Hlas are consistent in these two years, however, Miyun site shows a single peak while Guantao and Daxing sites show double-peak variation of Hlas, which mainly due to the different crop phenophases and irrigation conditions.

At last, the difference between Hlas and Hec in Miyun and Guantao sites had been discussed separately. In accordance with the underlying surfaces, the reasons for the difference between Hlas and Hec can be attributed to the energy balance ratio of EC, the heterogeneity of the underlying surfaces as well as the relative weights of the overlap area between EC and LAS measurements. While in Guantao site, apart from the above reasons mentioned in Miyun site, the atmospheric instability may be one of the main reasons that contribute to the difference between Hlas and Hec.

Key words: Large aperture scintillometer, Hai River Basin, Data processing and quality control, Temporal-spatial characteristics